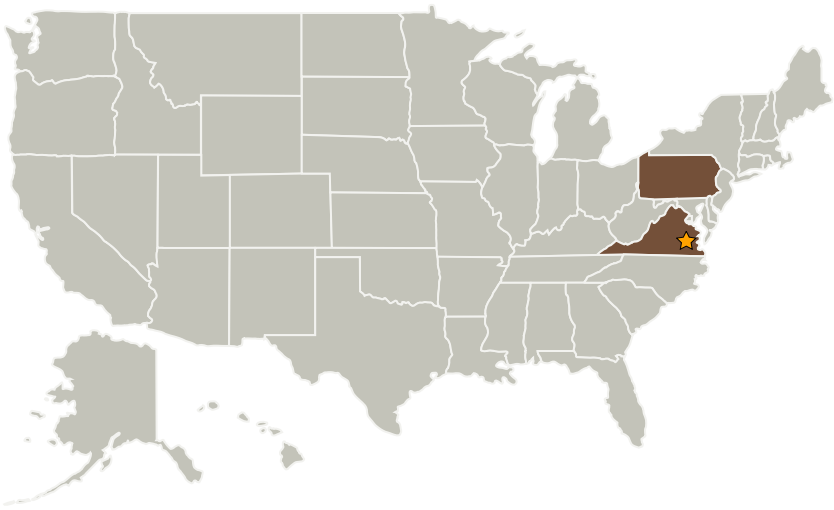
Advanced Electroactive Single Crystal and Polymer Actuators for Passive Optics, Phase II

Completed Technology Project (2005 - 2007)

Project Introduction

Large stroke and high precision electroactive single crystal and polymer actuators are desired for cryogenic passive optics such as Fabry-Perot Interferometer (FPI) and Fourier Transform Spectrometer (FTS) in NASA remote sensing missions. The results of the Phase I program have successfully demonstrated the feasibility of using electroactive single crystal and polymer actuator concepts for large stroke, high precision cryogenic actuations for passive optics. We believe this result justifies the Phase II continuation to develop electroactive single crystal and polymer actuators for cryogenic tunable FPI and FTS for remote sensing applications. In particular, single crystal stack actuators with stroke of 25 um at 77K, flextensional actuator with stroke of 100-200 um and hybrid single crystal /polymer HYBAS actuators with stroke 1-2 mm will be developed for both current cryogenic tunable FPI and future passive optics. Single crystal piezoelectrics are attractive because they exhibit 3 to 5 times the strain of conventional piezoelectric ceramics, have very low strain hysteresis, and retain excellent piezoelectric performance at cryogenic temperatures. HYBAS actuation concept exhibits significant strain improvement by combining single crystal piezoelectrics and EAP.

Primary U.S. Work Locations and Key Partners



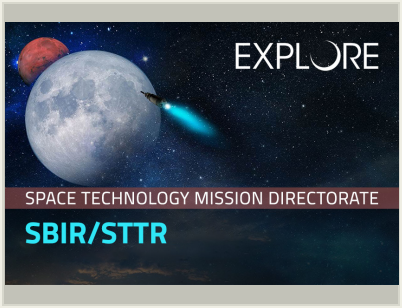


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Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Langley Research Center(LaRC)	Lead Organization	NASA Center	Hampton, Virginia
TRS Ceramics, Inc.	Supporting Organization	Industry	State College, Pennsylvania

Primary U.S. Work Locations	
Pennsylvania	Virginia

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.3 Mechanical Systems
    - TX12.3.7 Mechanism Life Extension Systems